Teacher Resource 5.2

Guide: Network Component Descriptions

Create a PowerPoint presentation about the different network components. Describe the role each network component plays in a network, its function, and its level of intelligence.

Network Interface Card (NIC)

A *network card* that plugs in to your computer, the NIC is a circuit board that allows you to plug in an Ethernet cable and connect your computer to a network or the Internet. Every interface card has its own unique MAC (Media Access Control) address that distinguishes it from all other devices on the network and on the Internet. Internet Protocol (IP) addresses are assigned by software and can change, but the interface card’s address is forever assigned to its hardware.

Repeater

*Repeaters*, as their name implies, simply repeat a message. They are used in networks that need to send messages across longer distances than the wires themselves can carry the message. So, installing a repeater along the way, between two cables, prevents the message from getting weak and allows it to reach the final destination. Repeaters can’t read addresses or data, but they can regenerate a weakened signal. Repeaters are often used in transcontinental and submarine communications cables, because the attenuation (signal loss) over such distances would be unacceptable without them. Repeaters are used in both copper-wire cables carrying electrical signals and in fiber optics carrying light. In Ethernet networks, hubs and switches are used as multiport repeaters.

Hub

*Hubs* connect a few computers on a local area Ethernet network. They do not read MAC addresses, so they send data packets to all the computers on the network. The computers then read the addresses on the data packets, collect messages directed to them, and reassemble them as directed. (Hubs for the most part have been replaced by switches.)

Switch

*Switches* are smarter versions of hubs and can read the MAC addresses attached to data packets. Rather than broadcasting messages to every computer on the network, switches send data packets only to the computer they’re intended for. Like hubs, switches have multiple ports for computers to plug in to—but because they do not slow down the network with extra, unnecessary broadcasts, switches can be used to join more than just a few computers. Many businesses connect all the computers on their network through one or more central switches.

Router

*Routers* are the *outers*, the components that sit at the edge of a local network and connect it with the larger Internet. They have the ability to read the IP addresses on data packets, and they can also look inside a message that gets sent across the network to see what kind of message it is. Routers direct incoming messages to the right computer and direct outgoing messages to the fastest route to their destination.

Gateway

*Gateways* are intelligent routers that sit at the edge of a network. They have all of the abilities of a router, plus they can translate between network protocols. Since each network can use only one sort of protocol, gateways are used to connect two networks that are running different protocols.

A typical network topology of routers, switches, and hubs would look like the following diagram. For home and small businesses, the router and switch are usually combined into a single unit that includes Wi-Fi and ports for (typically) four wired computers.

